



# THE VOLVO CLUB OF B.C.

## MAY 2026

29 Bedingfield St., Port Moody, B.C., V3H 3N2

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Annual membership fee \$25, To join: Call or write Gregg Morris. See above.

or view our Website [www.volvoclubofbc.com](http://www.volvoclubofbc.com)

WE WELCOME POLESTARS



V.C.B.C. is the

## B.C. Chapter of Volvo Sports America

### 1800 Register

To join VSA write to, PO Box 352 Fairless Hills, PA 19030-0352

Email: [membership@vsa.org](mailto:membership@vsa.org) Annual membership fee US\$40 Website [www.vsa.org](http://www.vsa.org)

WE BELONG TO THE NATIONAL ASSOCIATION OF CAR CLUBS OF CANADA

## UPCOMING VOLVO EVENTS (also see our website [www.volvoclubofbc.com](http://www.volvoclubofbc.com))

**JUNE 7, 8 & 9, 2026 VOLVO CLUB SPRING DRIVE** Note: Make your motel reservations soon, This year we will take a 3 day 2 night drive staying in Kamloops June 7 and Lillooet June 8. **Route Details: Sunday June 7, 2026** Meet 10:00 a.m. at the old Chevron gas station IN HOPE!!! ( 885 Water St., Hope, BC) We will leave Hope at 10:30 a.m. Bring a Picnic Lunch and chairs. Hope to Princeton on Hwy 3, North on Hwy 5a to Aspen Grove and west on the OK connector to Merritt, North on 5a to Kamloops. Make your own reservations soon!!! at the Vista Inn, 626 Columbia St. W, Kamloops BC, V2C 1C1 ph. 250-214-6800 Mention the Volvo Club of BC, Discounted Rate including tax and breakfast is \$176. 1 month cancellation. If you are willing to pay the normal rate (\$175+tax) the cancellation is only 24 hours. **Monday June 8, 2026** North on Hwy 5 to Little Fort, West on Hwy 24, South on Watch Lake Rd, South west on Green Lake Road to 70 Mile House, South on Hwy 97 to Hat Creek and west on Hwy 99 to Lillooet. Make reservation at the Mile 0 Motel in Lillooet 250-256-7511. room rate \$138 includes tax, 24 hour cancellation. **Tuesday May 9, 2026** Up early and onto Hwy 99 the Duffey Lake Road to Pemberton. Breakfast in Pemberton then home via Hwy 99 through Whistler, Squamish to Vancouver. **Call or email Gregg Morris at 778-988-6694 or [grmorris@shaw.ca](mailto:grmorris@shaw.ca). If you plan to attend the drive please notify Gregg so you can be kept up to date on any changes.**

**JULY 5, 2026, 5pm to 9 pm VOLVO CLUB OF WESTERN CANADA , BRICKS AND MORTAR SUMMER MEET AT THE IKEA in CO-QUITLAM.** For information call or email Patrick Sullivan 604-818-9631 or [p-sullivan@outlook.com](mailto:p-sullivan@outlook.com).

**JULY 11, 2026, VOLVO CLUB SUMMER CRUISE AND PICNIC.** Destination will be the Fraser River Heritage Park on the east edge of Mission. Start time 9 a.m. at the Chevron at the 232 St exit (south) from Hwy 1 (the Freeway). Allen will lead us on a scenic route west to the Golden Ears Bridge, across the Fraser River, and then east it Mission. For more info Contact Allen Hiebert 778-686-0345.

**AUGUST 8-9, 2026, BC HISTORIC MOTOR RACE WEEKEND, Mission Raceway, Mission ,BC, \*\*\*\*Lets get out and support the Vintage Race Club!!.** There will be car club parking and parade laps of the track. See the vrcbc website and the behmr website for more information. **or call Gregg Morris 778-988-6694**

**SEPTEMBER 16 to 19, 2026 VOLVOS IN OSOYOOS,** Stay at the Poplars Motel on the lake **BOOK SOON BECAUSE THERE WILL BE A SECOND GROUP AT THE MOTEL WHEN WE ARE THERE.**( Manager Nicole at 250-495-6035 room rate \$155. Event will include a Winery Tour, Scenic drive, Pot luck dinners. This is the 23rd year we have visited Osoyoos. Give me a call if you would like more event details. **Gregg Morris 778-988-6694 or [grmorris@shaw.ca](mailto:grmorris@shaw.ca)**

**SEPTEMBER 26, 2026, (SATURDAY) V.C.B.C. ANNUAL CATES PARK PICNIC AND AGM**

**VANCOUVER ISLAND EVENTS:** Watch the website. [www.volvoclubofbc.com](http://www.volvoclubofbc.com) or call Jamie Graham 250-507-0832

**WASHINGTON VOLVO EVENTS** such as Volvo show in Port Townsend July 18 and the Whidbey Island WAVE event see [www.psvsa.org](http://www.psvsa.org)

## REPORT OF PAST EVENTS

### HISTORIC MOTOR RACES (HMR)

2025

Mission Raceway Park

August 16-18, 2025

Gregg Morris

I look forward to the HMR because it is the one weekend in the year where the Mission Track is steeped in old race cars with their drivers and support crews. I do my part by camping at the track in my bronze 544. Typically I camp at the west end of the paddock near the best race view-

ing bleachers and the circus tent where Friday's Westwood tribute Hamburger feast and the Saturday HMR banquet are held.

On Thursday, August 14, 2025 as I was gathering my camping gear I heard that the weekend weather forecast was for rain and lots of it. I



could not believe my ears. What a stroke of bad luck considering the summer has been for the most-part hot and dry. I looked at all the Mission weather forecasts in the faint hope of finding a sunny loophole. No luck. I had pretty much decided to skip it this year when Dave Rush offered me a space on the floor of his Motorhome to put my foamy and sleeping bag. Good enough! The trip from Port Muddy to Mission was like driving through a 30 mile long car wash.

With this crappy weather I half expected to find an empty racetrack, but not so. There were lots of participants setting up, in spite of the rain. The Friday night, Westwood commemorative hamburgers in the circus tent tasted great and the rain had eased off a bit. By morning there were lots of puddles but the rain was now showers. Things were looking up. After breakfast courtesy of Dave I made a tour of the paddock. Only one Volvo Racer this year. Robin Strachan of Rossland in the Kootenays brought his nicely prepared black 67-122S and he was pitted next to his brother who was racing a Datsun 510. Their Mom and Dad (Mike Strachan, a long time VCBC member) would be there to cheer them both on.

Sadly Ian Wood wouldn't be racing Sven his 69 Volvo 142 at this event. A bloody great articulated bus ran into him as



he was cycling on Kingsway to his shop (IWE Rear Ends Only) in Burnaby. He is incredibly tough, but even Ian cannot take on a bus. He suffered a broken hip. In spite of the injury, Ian was there at the race helping to keep the whole show running. He could be seen steaming back and forth in the paddock on a bike or a quad or most often a cane. While watching Ian limping I noticed that he had lots of company. The more vin-

tage of the Vintage Racers were also limping or hobbling about. Time gets us all.

There was a happy reunion at the track. Ian Wood's son Hayden had come to watch the action. Hayden lives in Woking England, races motorcycles and works for the competition division of the McLaren Group founded in by Bruce McLaren in 1963. McLaren Racing competes in multiple top-tier racing series, including Formula 1, Indy



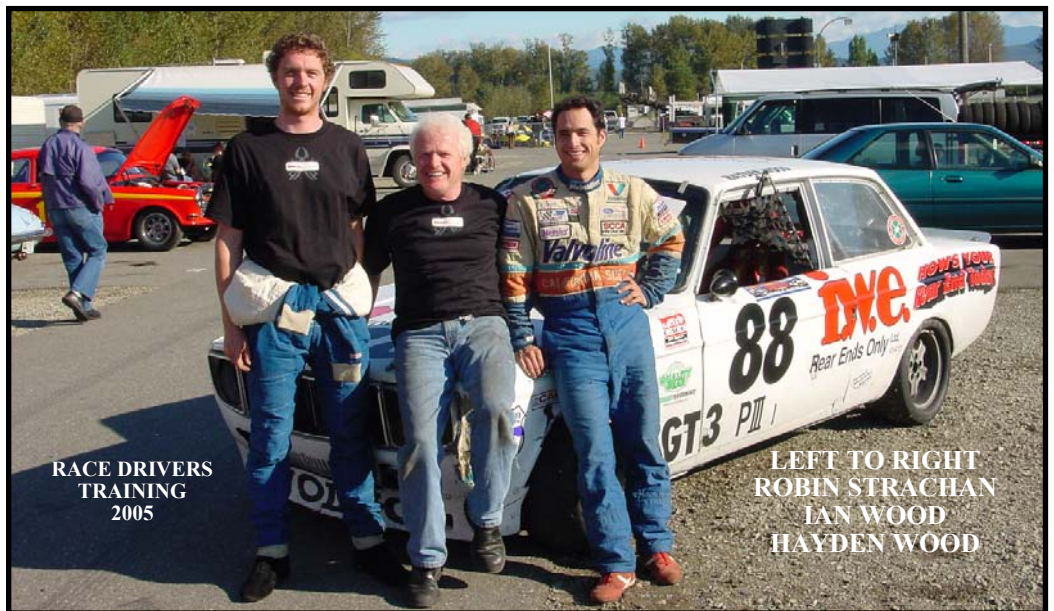


Car and Formula E. McLaren also builds hyper-cars for the street, and Vancouver has its share.

When Hayden was 15 or so, Ian thought that getting him a car to restore would be a character building activity. Given Ian's history with Volvo he chose a 123GT as the restoration project. When Hayden is home for a visit he puts in a little time with the car. It would sure look good parked in the McLaren parking lot. Robin Strachan (who was racing his 122S) and Hayden are long-time friends, and both took driver training together at Mission in Ian's Volvo 140 race car. I took a picture of the three of them in front of Sven on that day in 2005. Seeing as they were all at the track again, I suggested we take another group picture of them, this time with Robin's race car. All three of them must have found the fountain of youth because they look the same today as they did in last picture taken 20 years ago. Just to finish off the coincidence Robin like Hayden also has a 123GT under restoration.

The Vintage Racing Club of BC (VRCBC) first raced at the fondly remembered Westwood Motorsport Park in Coquitlam from 1959 to 1990. In 1990 the Westwood racetrack property was developed into an upscale residential subdivision called Westwood Plateau. The racers had no choice but to move to the road track appended to the Mission Drag Race strip. Very few of the cars racing at Westwood are still racing in Mission. The cars change but the enthusiasm for the sport remains the same.

The weather continued to improve and most of the races enjoyed warm, dry track conditions. The Saturday



RACE DRIVERS TRAINING 2005

LEFT TO RIGHT  
ROBIN STRACHAN  
IAN WOOD  
HAYDEN WOOD



ROBIN, IAN AND HAYDEN 2025 IN FRONT OF ROBINS 122 RACER

evening banquet provided good food and various speakers gave a summary of the year's Vintage Racing Club's activities. There were also tributes to racers present and past.

In the track parking lot, there was a section reserved for enthusiast's cars. At the lunch break Saturday and Sunday these cars were invited to take a few parade laps of the track. Ironically many of the enthusiast's cars were the type of cars that you would have seen racing at Westwood.

Sunday was an entertaining day of racing with no serious incidents. At the end of the day the race cars were driven onto their trailers, or winched if the car quit before the races did. The sunny drive back to Coquitlam erased the unpleasantness of Friday's rain. All in all it was a very good race weekend.



## EDITORIALS AND LETTERS

### CLUB STUFF

#### Gregg Morris

#### Vancouver Island Members New Island

**Contact.** Bob Cuthill was our Island Director from 2001 to 2005 at which point he decided to retire. We asked for a volunteer to take over being the Island contact but no one stepped up so Bob has been "acting" director for a mere 20 more years. Bob told me at Cates Park that someone who looks just like him is turning 80 this year and just in case it was actually him he requested that I stop forwarding Vancouver Island related VCBC questions and people to him. We all owe Bob a debt of gratitude for generously donating his time skill and boundless enthusiasm to our club over all those years. Thankfully Jamie Graham of Victoria volunteered to take over as Island Contact. Jamie can be reached at 250-507-0832 or ntegrity@telus.net. Be very nice to him. Island volunteers are hard to find.

**Membership Renewal Time Again.** Renewal notices and return envelopes will be surface mailed to all those members whose membership expires June 30, 2026. If you do not receive a renewal notice your membership is still good to 2027 or beyond. Our membership: currently sits at 250, similar to the last 2 years. Memberships flow in at

renewal time and trickle in from events particularly Cates Park Picnic and AGM and from the website. This year Patrick Sullivan has been notifying the web based WESTERN CANADA VOLVO CLUB of our VCBC events which adds more participants. It definitely helped Cates attendance for 2025 on a marginal weather day. Patrick is also a VCBC member, a certified Volvo Service technician and a very nice fellow. Thanks Patrick.

**Website:** Cam Finnigan and Gil Graham continue to run the website. Both are solid guys. Cam is a computer engineer and keeps the site live. Gil does the day to day work on the site such as adding and removing classified ads, updating the event list, posting the newsletter to the online library, updating the various pages etc. Cam with help from Club Director Rohan Soulsby has been modernizing our website starting in January 2026. Many thanks to these gentlemen for generously donating their time. It is appreciated.

**EVENTS:** We have 2 events that are out of the lower mainland and involve motel reservations. This year the events are the Spring Drive June 7-9, 2026 and Volvos in

Osoyoos September 16-19, 2026. If you would like to participate in either of these events, call the motels as early as you can to insure you get a room reservation. More people are travelling in BC these days so rooms book up. Look at the Events list on Page 1 of this newsletter to get contact numbers for the Spring Drive accommodations and the Volvos in Osoyoos accommodation.



**WINTER SUPPER 2026**  
**Old Spaghetti Factory**  
**Gregg Morris**  
**January 21, 2026**

It was a great night for a third week in January. There was no snow, no rain and clear skies and it was not too cold. Dave McAree got to the New Westminister Spaghetti factory early so he could lay claim to the North West corner of the restaurant that is separate from the rest of the facility. The day before the supper I had a chat with the manager. He comes from the “I’m the Manager and you’re not” school of management. He was fixated on how many people would attend. I explained that we don’t know until they arrive. I also explained that the section of the restaurant we requested has always been a good fit for our group. His response. “How many people will be coming? 20?” I gave up at that point. Yup, there will be 20 people. That seemed to satisfy him.

In fact there were 25 people turned up but they didn’t all arrive on time thanks to Vancouver’s ever worsening traffic. It was particularly bad for the North Vancouver folks.

John Cripps brought his digital projector and a “Mid-century-modern” projection screen. He provided a non-stop picture-show of our club events and others. It is nice having that in the background and we appreciate John making it happen. We brought along some raffle tickets and a few raffle prizes which we gave away.

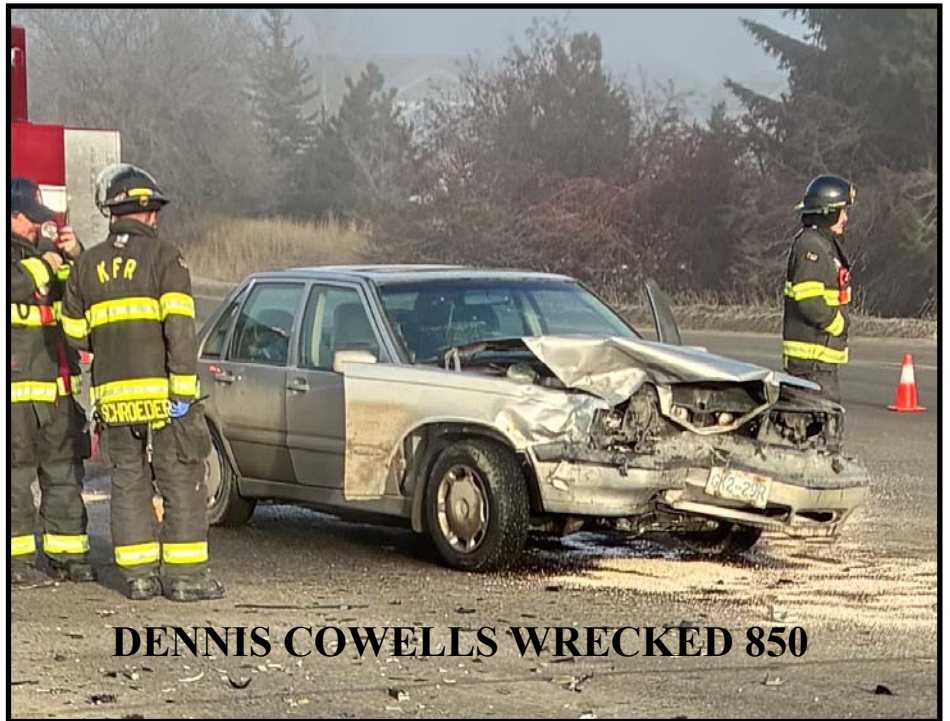
Near the end of the evening Bert

Sherlock thanked everyone for joining us and talked about the Non-perishable food drive to be held 5 p.m. Sunday February 1, 2026 in the under-cover parking area of the Coquitlam Ikea. The meet is being organized by Patrick Sullivan of the Western Canada Volvo Club and VCBC is invited to participate.

When Bert had finished speaking, everyone paid their bills and hit the road.

There was one odd thing about the evening. Dennis Cowell and Yukio Ozawa from Kamloops didn’t turn up

for the supper. Dennis always turns up. Dave McAree solved the mystery. It turns out they were in a nasty auto accident a couple of days before. According to Dennis an idiot ran a red light and t-boned the front right fender spinning Dennis’s 850. You can see from the picture that it is a write off. The air bags deployed but the seat belts hurt both Dennis and Yukio in the chest and shoulders. Yukio sustained broken or cracked ribs. They are sore but getting better. I hope Dennis can convince ICBC to give him enough money to buy a replacement 850 wagon.



**DENNIS COWELLS WRECKED 850**



**OLD  
SPAGHETTI  
FACTORY**

**MY FIRST VOLVO**

**Ilona Milligan  
1963 PV544**

This “My First Volvo” story was sent to us by Olof Malmberg who generously helped a lady in distress. Here is the story. It may not be Ilona’s first Volvo but it is her second and after 62 years of ownership who’s counting.

**Olof’s good deed.**

Here Olof tells a story about Ilona and her red PV 544. You may recall Ilona and her daughter have come to our Cates Park meets the last 2 years with a red 1963 PV 544. At the last meet she asked me if I would help her with the car since she has had a very difficult time getting anybody to help her. None of the local shops really wanted to get involved. I reluctantly agreed so at the end of October she brought the 544 to my garage in Tsawwassen.. Basically she said do whatever needs to be done.

I started by removing a ton of dirt and slowly bit by bit replacing parts both damaged and worn out items and correcting and removing a bunch of odd aftermarket add ons. Plus there was a bunch of odd electrical wires that I removed and turned the electrical system back to original. The engine runs smoothly so it did not require any work. The upholstery was in very bad shape. Luckily I had a good used set that I installed. Finally I painted the engine and part of the firewall and then I did some temporary bodywork. ( A lot more bodywork needs to be done ). By the end of May 2024 Ilona and her daughter came and picked up the car. They were very appreciative of my work and drove the old Volvo away with a smile on their faces. I was also smiling because now I could go on to another project but mostly I smiled because they were so happy. The cold hours spent in my garage were worth it.

**Here is Ilona’s Story**

Hi! This Volvo was bought in Saskatoon, Sk. for a total price of \$2100.00 (Wow)! We had a white Volvo which we traded in at that time. This car then lived in Saskatoon while I attended the University of Sask. and then moved to Regina until 1980. My daughter drove it in Winnipeg for a couple of years. We then moved to Burnaby, BC in 1980. The car was used as a family car, for work, camping trips and thousands of miles of pleasure. It was wonderful in snow, with its studded back tires, and 100 lbs of salt in the trunk.

I believe the odometer has turned over at least 3 times. In those days it was considered to be an elite sports car. Drivers of Volvos in Sask. used

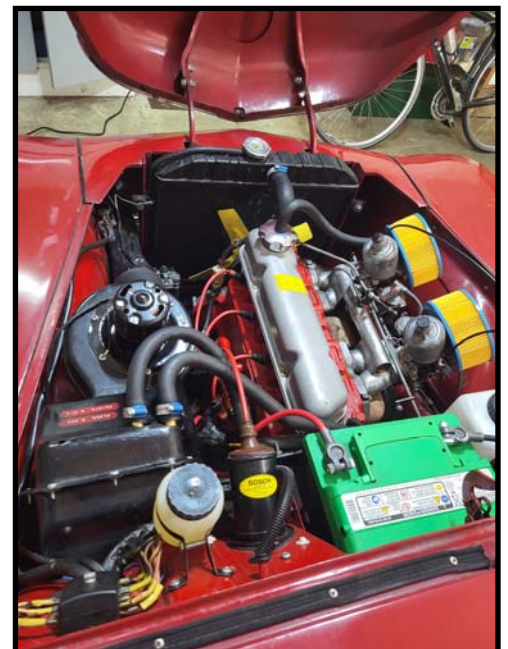
to make a V sign as they passed other Volvos. It was a very popular vehicle! The engine was re-done in the mid 70”s.

Both of my daughters learned to drive in that car and to this day prefer driving a standard. Once in BC my oldest daughter took it over and drove to UBC. She used it for a few years for work with Burnaby Park and Recreation Dept. She then parked it in the garage for too long a time, and I decided it needed to run or go. A fellow by the name of Nick Seldon got it going again much to my delight. I know it unfortunately needs lots of work. I have been the owner of this car for 62 years, and guess that is why it is so special.

The exterior was painted in the early 1980’s. My first husband died of colon cancer at an early age. Later when I met my second husband, I thought he would think I was crazy with my old car. However, he had a 1959 Porsche so understood

completely. Life was happy ever after. He was going to work on these 2 old cars when retired but that didn’t happen. We are so glad this old Volvo met Olof and I will be eternally grateful. I was a nursing instructor, teaching in Regina, and at BCIT.

Cheers, Ilona



# SOMETHING DIFFERENT

## DISNEYLAND OPENING JULY 17, 1955



### DISNEYLAND'S AUTOPIA

Gregg Morris

In 1955 when I was 4 years old Walt Disney opened the Anaheim Disneyland and one of its earliest attractions was Autopia. This is the time when freeways were weaving their way through North America and Walt saluted this by building a 1 mile long freeway in Disneyland. It was fittingly called Autopia and it was populated with 5/8 scale, classy looking fibreglass cars with rear mounted gas powered engines driving the left rear wheel. The best thing was that kids from 6 to 16 could drive those cars on Walt's own freeway. Walt even had his own car with small bumpers and no governor on the engine.

In 1961 my parents took my brother and me to Disneyland. I was ten and Randy was 5. We had grown up watching the Disneyland on the single CBC channel on our black and white TV.

I was already interested in cars and could not wait to drive on Autopia, and I did so over and over until my Dad's patience or our ride allowance ran out. Now 64 years

later, thinking about that drive still is a fond memory and I think my fascination with cars started on Walt's freeway.

What brought this all up was a bunch of very old car magazines I found at the San Diego Big 3 auto swap meet. In the September 1955 issue of Road and Track I found a road test on Disneyland Autopia from the year Disneyland opened. All those happy memories came flooding back.

I let google tell me some more stories about the famed ride.

### DISNEYLAND AT 70:

**Bob Gurr Couldn't Steer Clear of Disaster When Autopia Opened**

By Chuck Schmidt

April 21, 2025

Disneyland, known as The Happiest Place on Earth, celebrated its 70<sup>th</sup> anniversary on July 17, 2025. Perhaps the most popular and most problematic attraction when Disneyland opened on July 17, 1955, was the Autopia cars.

For the most part, the Autopia cars were the handiwork of Disney Legend Bob Gurr, who was hired because he was a car stylist, not a mechanical engineer. But, like many of Walt Disney's staff at the time, Gurr learned on the fly.

When Walt made it known that he wanted to have an attraction where guests could drive miniature cars, an importer of German amusement autos found out and sent over a test model, even painting the word "Disneyland" on the hood. But Walt had other ideas; he wanted to get into the automobile manufacturing business himself. Roger Broggie, who was in charge of the mechanical aspects of each park attraction, had a basic chassis built by a local mechanic, while Gurr made drawings of the body of the car.

Students from the Art Center School of Los Angeles built a full-size clay model of the car in their teacher's garage. When it was completed, Walt climbed into the



Walt Disney sits in the driver's seat of the original clay model of an Autopia car



model, gave his approval (so much for long, drawn-out high-level staff meetings!), and the arduous process of bringing clay model to functioning miniature auto began.

Glasspar of Costa Mesa, California, was contracted to build 40 Autopia Fiberglass car bodies, while MAMECO Engineering in Newport Beach was hired to assemble all the parts needed to make the miniature vehicles mobile. Hutchinson's Auto Paint added the finishing exterior touches. By the time opening day arrived, the bright and shiny Autopia cars were ready to roll. Or so everyone thought.

Several of the 40 Autopia vehicles were pulled from their Tomorrowland track to take part in the opening day parade. But the heat of the day wreaked havoc with the car's engines. "The cars began to vapor lock and stall after idling in the heat for 15 minutes or so," Gurr said. After the cars were all restarted, they took part in the parade before heading back to the Autopia track and the attraction's official grand opening.

"I was delighted to watch the happy faces on the little guests as they finally got to drive 'a real gasoline car' at Disneyland," Gurr said. "But my delight turned to dismay as car after car suffered a variety of failures."

The original Autopia track was designed to look like an actual highway. As a result, there was no center guide rail and cars could be driven off the track and head back to another section, where several head-on collisions occurred.

As the number of working cars dwindled to a precious few, Gurr and his Autopia pit crew couldn't keep up. Still, people lined up on the ever-growing queue to ride.

When Gurr – who spent most of the day in a futile attempt to repair the damaged vehicles – had a chance to step back and review the damage, it was extensive. "We had distorted bumpers, rear wheel bearings were shot, and there was extensive axle and brake damage," he said. By the end of the day, there were just two working Autopia cars left. In the following days, Gurr – using his own tools – worked feverishly to repair the damaged cars. At one point, Walt Disney stopped by to observe the mangled wreckage.

"Bobby, whadaya need?" he said. At which point Gurr responded: "Some mechanics and some repair equipment." Walt immediately had a small shed, tools and two mechanics sent over and the repairs began. Over the next few months, Gurr was able to solve most of the cars' problems, from faulty speed governors to malfunctioning clutches, drive chains and rear axle bearing housings.

Over the years, Gurr was involved in several upgrades to the Autopia attraction,

**From Road & Track September 1955**

# DISNEYLAND "Autopia"

photography: Ralph Poole



*Walt Disney's personal "Autopia" machine has neat bumpers, chrome wheels, special upholstery and no governor. There is also a special black and white police car!*



Strother MacMinn and Bob Gurr enjoy a demonstration.



The true, professional styling touch is quite obvious in this rear end view.

**ONE** of the stellar attractions at Walt Disney's 17 million dollar Disneyland will be "Autopia", an exciting road-race course where future G.P. drivers can get first-hand experience.

No ordinary vehicle would satisfy the rigid specifications set-up by the Disneyland planners: good appearance, maximum utility and

Rear mounted engine drives left rear wheel.



perfect safety. Accordingly Disney's own automotive division, headed by R. H. Gurr, was presented with a most difficult problem and the result is shown here.

The styling has just the right touch of Italian flavor and proportion is excellent at about 5/8 scale. The seating accommodates two adults if necessary but is intended primarily to suit the age span from 6 to 16 years.

Controls are unique, for there are two accelerator pedals so located that either may be used conveniently according to one's leg-length. There is also a long external lever to allow adult overrule of impatient young throttle stompers at the beginning of the one mile ride. Brakes operate automatically upon release of the accelerator, or by a backward movement of the hand lever. All the tyre need do is step on the gas and steer. A tripping device under the chassis insures that the brakes are applied as the ride ends.

Prototype cars have been rigorously tested and even in "hot-rod" form it is impossible to overturn. About 32 identical machines (with full-wrap bumpers) were available when operation "Autopia" commenced at Anaheim, California, in July of this year ●

**SPECIFICATIONS**

List price	.....	not for sale
Wheelbase	.....	64.0 in.
Tread	.....	34.5 in.
Tire size	.....	5.00-8
Curb weight	.....	475 lbs.
Body	.....	fiberglass
Engine make	.....	Gladden, 318 cc
type	.....	1-cyl. 4-cycle
bhp	.....	7.5 at 3400
Clutch	.....	centrifugal
Transmission	.....	vari-speed belt
Suspension	.....	none
Governed speed	.....	11 mph



Drive-trim includes real wrap-around bumper.

ROAD & TRACK, September, 1955



which remains to this day, one of the highlights of anyone's day at Disneyland.



## TECHNICAL TIP

### 1979 VOLVO 245 TURBO COMES TO LIFE

By Beau MacGregor,  
Owner, Manieri Motorworks in Bellingham, WA

Modified automobiles are always more challenging to own and repair, especially if someone else made the modifications. With the proliferation of television shows, online forums, and YouTube channels focused on vehicle restoration and modification, it is all too easy to believe - after watching a show in which a rusty, long disused hulk becomes a fire-breathing custom hot rod in only 30 minutes - that one can simply bolt a bevy of high performance parts to a fine old automobile and call it good. Beware: Its never as simple as it looks. Online car culture - with all its instant gratification and go-fast bravado and often without an eye towards usability or longevity- is no match for formidable expertise of the original Volvo and Bosch engineers who created our cars. The following is a brief account of just such a car

No sooner than my shop had completed a litany of fine-tuning work on a customer's lovely, mildly customized red 1969 142s, - another project car from the same family arrived: A stock looking brick red 1979 Volvo 245DL to which someone has added a turbocharger and intercooler. Its engine wasn't running correctly and seemed to be getting steadily worse, according to the car's new owner. The father-son duo who own the 142S and the 245DL, respectively, are local Volvo enthusiasts who enjoy modifying their cars for spirited driving. While their penchant for go-fast modifications differs from my own automotive sensibilities, they are good people, easy to work for, and I've enjoyed getting to know them over the past couple of years.

The 245 arrived in a rather ominous fashion one evening, shuddering and smoking its way

into the shop's front lot, portending an extended stay and probably a late dinner that night. The son had purchased the vehicle two months before from a local seller, who claimed to have installed a B230FT from a Volvo 740 Turbo five years prior and has been using the 245 as a daily driver since. "Runs great" he reportedly told the buyer.

Arrow straight and wearing its original single stage cinnamon paint, this US-market 245 looked stock, other than the window tint, 16" Hydra wheels and lowered ride height courtesy its IPD coil springs. A crop of aftermarket gauges had sprouted from the dash top and driver's A-post, and XC70 front seats had been installed in this otherwise well-preserved wagon. A turbocharger, intercooler, and all manner of haphazard aftermarket plumbing, littered the engine bay. No B230FT was present: Instead, an older B21 or B23 was in place, the tell tail of the unpainted valve cover and metal timing cover plain to see. Hmm. Did this car's builder simply hang a turbo-



I took the car for a brief test drive: Engine idle quality was noisy and lumpy but somewhat consistent. While underway, the



engine produced enough power to propel the car like a normally aspirated 240 that had needed a tune up, but once in boost, the car fell flat on its face. Though it would not stall, at 3psi of boost engine power cut out completely, then surged back to build up boost again. Think of a young driver learning how to work the clutch in a Honda Civic, the car lurching dramatically along. Just to add to the fun, each apparently boost-induced cut in power was accompanied by significant hissing from under the dashboard, seemingly from two places, as the unmistakable smell of burning engine oil wafted through the cabin. In my haste to regain the car's composure (and my own) I inadvertently activated the wipers: Their linkage was striking something related to the parts store gauge cluster atop the dash, moving them laterally with a pronounced metallic click with each cycle. Yikes. I returned to the shop, parked the stricken 245 and went home to dinner. This could wait.

A couple of days later, with two Subarus, a Toyota, and a most uncooperative BMW E61 turned back into the wild, I set about assessing the 245. The engine was of course not from an 85-740 Turbo: Block number 498978, and head type 1000405 corresponds to a 1982 B23E w/EGR, sold new in a Canadian market 240. It was not originally turbocharged, as evidenced by the lack of turbocharger oil supply/return bosses, turbocharger support provisions in the engine block. On this example, turbocharger oil supply and return lines had been adapted to the oil pressure switch port, and an oil return via brazed fitting on oil pan, respectively. The B23E came with flat top pistons and 10:1 static compression, and a high lift, long duration "K" grind camshaft, both of which this engine retained. It's a nice, powerful motor especially well adapted to a manual transmission but certainly not meant for forced induction. While modern turbocharged gasoline powered engines can handle high static compression (12:1 in some cases) early eighties engine technology required much lower static compression to avoid detonation and quick destruction.

"FT" Turbocharged red block engines came from the factory with lower static compression via dished pistons, sodium filled exhaust valves to better dissipate significantly higher heat load from compressed charge air, and a "T" grind camshaft, optimized for forced induction. A turbocharger on a B23E is cause for concern: High static compression combined with forced induction can - if the boost is not left at a mild level- quickly melt engine internals even if the engine is running properly.

Further investigation revealed the presence of a Bosch Jetronic LH 2.2 fuel injection system (1985-1988) and an EZK117 Ignition system 89-95). A high-quality af-

termarket conversion wiring harness, likely from DaveBarton.com was present, though its lacked a ballast resistor connector to run the low impedance fuel injectors specific to the turbocharged red block. An inventory of fuel and ignition components revealed the following issues.

Incorrect ECU #280000544 non-turbo B230F. 280000518 / 541 required.

Incorrect EZK control unit #260201011 non-turbo B230f. 260201012 required.

Incorrect fuel pump present: 580464126 BMW E21 320i, 580464025 needed.

Incorrect fuel injectors present: 280150415 BMW 6-cylinder application.

Incorrect fuel pressure regulator: 2.5bar v. 3bar for turbo cars.

No fuel injector ballast resistor present.

Additional build quality issues revealed that the crankcase ventilation system was incorrectly connected, such that charge air was allowed to enter the crankcase under boost. No check valve was present on the climate control vacuum pickup, and the ancient brake booster check valve had failed: Both the HVAC vacuum lines and booster were subject to charge air intrusion under boost. "Well," I thought shaking my head, "That explains the blown front engine oil seals and under-dash hissing."

In summary, only four application-correct engine management parts were present: The air 007 mass meter, throttle switch, idle air valve, and the ecu's coolant temperature sender. Everything else was poorly executed and just flat wrong, contributing to a leaking intake tract and insufficient fuel delivery. Intake and exhaust valve clearances were all extremely tight, averaging about 0.010", whereas Volvo specifies 0.016-0.018 for a warm engine. Without sufficient contact with the cylinder head for heat transfer, these exhaust valves were not long for the world. The supposedly new "high performance" blue plug wires had all but fallen apart on two cylinders, and the filthy throttle body was not even close to closing at idle.

On a hunch, I used a smoke machine to check for leaks in the intake tract: No obvious leaks were found up front but why was a small amount of smoke coming from under the rear of the car? Answer: An ancient, dangling fuel evaporative emission hose, long orphaned and dangling above the rear axle, I did not need the smoke machine know that the #4 exhaust manifold gasket was leaking.

While under the car, one couldn't help but to notice the odd angle of the steering rack: Someone had omitted the right-hand stand-off mount. The rack was about 10° off plane with the front cross member. Nice. This, in addition to the lowering springs, which when installed without steer roll correction brackets on the ball joints, creates

excess strain on the tie rods due to steep angles between the knuckle and the rack. Strange steering behavior ensues: Heavy, vague steering feel due to diminished direction force on the knuckles, creates significant and sudden changes in steering force required at the wheel as load and trajectory shift. Not all aftermarket parts are well thought-out: One change begets another...

The first order of business was to make the engine run properly. An intercooled, turbocharged engine is subject to a higher density of oxygen in the cooled charge air; therefore, the ability of the engine to receive the corresponding increase in fuel is imperative. On this car, the wrong fuel system parts were causing a dangerously lean running condition, due to too little fuel.

Incremental progress was made over several days as time allowed. I began with a proper valve adjustment, setting the clearance to a loose but heat absorbing 0.020". New tappet dampers, front engine seals, timing belt and tensioner, v-belts, spark plugs, and quality ignition wires followed. All this, plus a thoroughly cleaned, resealed and properly adjusted throttle body and functioning vacuum check valves allowed the engine to start and idle reasonably well, but without proper fuel management in



place, a lean running condition while under boost could cause engine damage.

Shiny aftermarket charge air pipes were present, but with no provision for a crankcase ventilation port. Larry Watson of Rainbow Auto Service brazed a port into place on the turbo inlet pipe one day while I was hunting for parts there. A nicely made aftermarket Yoshifab breather box was present on the car, and it didn't take long to correctly connect the hoses.

With this done, I set about sourcing the correct fuel and ignition pieces: Rainbow Auto Service had everything I needed, used, except the 3-bar fuel pressure regulator, was available new. The crux of this stage was the integrating the ballast resistor into the main fuel injection harness. DaveBarton.com is an excellent source of information for all things RWD Volvo, and produced, for a time, a line of 240-specific conversion harnesses that allow for newer running gear into older cars. The subject 245 had one of these, though an earlier version that lacked the resistor accommodation. Off came the intake manifold for access to the main wire loom: With the help of the Volvo's Green Book wiring diagrams, I was able to splice in pigtail removed from a 740 Turbo parts car, then plug in and mount the ballast resistor. Correct 0280150804 low impedance injectors, new injector seals, a new 3-bar pressure regulator, and intake manifold gasket were installed, after first verifying the functionality of the ECU'S coolant temperature sensor.

The presence of the correct fuel pressure regulator revealed another issue: The BMW E21 fuel pump was weak. It produced only about 35psi of line pressure, well below the specified 60psi needed to avoid pressure drop under full load conditions. Up the car went for a new fuel pump, in-tank-pump feeder hose, and sending unit seal.

The engine now started eagerly and settled into a calm, smooth idle, much like properly running 740 Turbo would do. It was time to drive the car: Gone was the boost-induced lurch, under-dash hiss, and rough running. The B23E's mild power to 3000rpm gave way to a significant shove to redline, 5.5psi of boost coming on in tandem with the K-cam's power curve. "Wow! The K-cam and a turbocharger can indeed work together!", I thought, trying to ignore the tell tail tick of the #4 exhaust manifold gasket leak that meant yet more time spent on the car.

Back in the shop, it was time to replace and exhaust manifold gaskets. A Garrett 13G turbo isn't large, but combined with its manifold, constitutes substantial weight. All factory FT blocks have a support bracket provision, but early B21F and B23F blocks do not. Therefore, on this car the entire weight of the assembly rests on the eight

manifold studs. New OE studs, nuts and the correct thick washers were installed, as well as new turbocharger mounting studs, nuts, and gaskets. The builder's improvised oil supply and return lines were a bit easier to deal with during this operation than stock, though the return lines port below the oil pan's "full pool" made for quite a massive oil leak when removed. With the manifold and turbocharger out of the way, the 740-style oil cooler/oil filter assembly was removed, cleaned and resealed. New engine oil (Liqui Moly 5w40) and a Mann filter were installed.

The last few miscellaneous items required to put the car back on the road were straightforward: Remount steering rack on correct stand offs, replace a torn LH rear control arm bushing, and perform a four-wheel alignment on the shop's Hunter Hawk-eye alignment rack. With the car now tracking straight but with weak steering wheel snap back to center courtesy of the lowering springs, I set about sorting out the electric cooling fan: It was not operating as it should while underway. This malady was traced to an incorrect temperature switch in the radiator: Someone had placed a coolant temperature gauge sender in the radiator, but only after modifying the radiator to accept the wrong part! Grrrrr! Rather than dealing with two round trips to the nearest radiator shop in Surrey, I promptly installed a new, unmodified radiator and the correct thermal switch, and presto! The fan cycles on and off when it should, keeping the engine at a steady 190°F of so. All this without having to ground the sender with a jumper wire to make the fan work. What a concept.

A thirty-mile test drive revealed a strong running engine with no behavioral issues.

Although still a 1979 245, the car now possessed the power of a healthy 740 Turbo. This is a meaningful improvement over the K-Jetronic system in the original 240 Turbo. The car will require further sorting to be truly reliable: A battery drain courtesy of the XC70 power seat custom wiring, climate fan replacement, transmission reseat, and of course a tie rod angle correction. Given the nature of the B23E, I've advised my client to keep an eye out for a good B230FT long block, and not to dial up any more boost in the meantime. That K cam really needs a bigger turbo to breath properly, but that means turbo specific engine modifications. Where exactly does one stop on a project such as this?

All told, many hours of shop time, a lengthy list of new & used parts, and a lot of the customer's patience was required to make this 245 a viable machine once again. With all the issues that car had upon arrival at my shop, that the car ran at all was improbable, much less functional as the previous owner's daily driver. I felt bad for my customer, a hard-working, enthusiastic young man who spent his dollars on this car not knowing what laid in wait. We've all been there. He's not the first to see an old car through rose-colored glasses and certainly will not be the last; for folks have been modifying their cars since the first Model T appeared. Such phenomenon has accelerated over the decades, but it still pays to do one's research ahead of time to know that you aren't buying someone else's guesswork and always obtain a thorough pre-purchase inspection for any car. The owner now has a great-running and very cool Volvo 245 to show for his investment!



**SWEDISH LEGO MASTER CREATES A WORKING VOLVO WAGON OUT OF BRICKS**

Brendan McAleer, Feb 11, 2024

Building a Volvo out of Lego seems hardly worth any interest or admiration. You need like two bricks to form the silhouette of a boxy 1980s 240DL sedan or wagon. Heck, you could pull it off with Duplo. However, one Swedish Lego Maniac has managed something truly impressive: a full size recreation of his own third-generation V70 wagon built out of 400,000 pieces — and it actually *drives*.

David Gustafsson was formerly a contestant on the Swedish version of *Lego Masters*, where he won the bulk of the bricks he used for this project. Apart from a metal frame and rolling stock, the V70 is entirely constructed out of Lego pieces, from the dashboard

(impressive!) to the seats (uncomfortable!). Completing the project took over a year.

What sets Gustafsson's work apart from other full-size Lego cars, like the *Bugatti Chiron*, is that it's the work of one person rather than a Lego-supported piece of marketing. The other difference is that this V70 isn't just a rolling chassis, but can be remote-controlled at low speeds, and is absolutely crammed with little Easter Eggs.



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## TECHNICAL TIP

### THE STORY OF A 940 CALIBRE MACHINE GUN

**Gregg Morris**

In November 2005 I was in need of a winter car, as apposed to a winter beater. This was a significant change in my car buying habit. Often when November rolled around I would find myself a semi beater with some redeeming features. These would usually be 142Es or Amazons or once in a while an 1800 series. I would drive the car through the winter, fixing it up at the same time. By the time Spring rolled around it would no longer be a beater. It would be clean inside and out. The paint would have been cut polished and waxed, the interior flaws would be fixed, the wheels painted and wearing good tires and any mechanical ills would be sorted and the car would be reliable, presentable and ready for sale to a newly minted Volvo enthusiast.

I can no longer remember why, but in 2005 I decided against the beater route and thought I would try a modern car. Modern is a relative term. In 2005 the newest car we owned was a 1992 244GL. Come to think of it, that is still the newest car we own. I bought my weekly Buy and Sell, moved up a couple of decades in the car sale listings and found a one owner garage kept 1991 940SE with 173,000 Km. The paint was shiny light gold and the interior supple tan leather and it came with all the service records since its purchase new at Don Docstader Motors.

After looking at the car and test driving it I had a conversation with the owner who was asking \$6000. I told him I liked the car and would make him an offer after I had it inspected by a Volvo dealership. I was not familiar with the 700 and 900 series cars and thought an inspection would be wise. As it was serviced by Dockstaders I decided to have Volvo of Richmond do the 153-point inspection and that turned out to be a good decision. 153 points is a lot of points, and the inspector came back with a long list of deficiencies. I am sure he hoped his list would keep their service department happy for a while. I reviewed the list with the inspector and after asking a lot of questions it became clear that none of the items were urgent and now 20 years and 127,000 km later some of them still have not needed attention. That inspection report was very helpful in negotiations to buy the car. After reading it the owner



agreed to drop his price from \$6000 to \$5000 and I became the happy owner of a very nice 940.

After purchase I discovered that my 91 940SE was quite a unique car. In 1991 the unloved Peugeot-Renault-Volvo V6 was put out to pasture and the all-aluminum straight six “white block” engine that would power the 960 was not yet ready so the 940SE stepped to the top of the line for 1991 and was essentially a 760Turbo in a 940 body. It was all those 760 bits that have endeared the car to us.

Rose and I have now owned the 940SE for 20 years and it has been an excellent car. We use it as a winter car because with a little planning it is just excellent in the snow. Why? Because it has the 760 Rear Wheel Drive, Independent Rear Suspension, Limited slip Differential and Self Leveling Shock Absorbers. Just put a few layers of bricks in the trunk and wear good snow tires and away you go. Have you ever heard of the Volvo website titled “Turbo Bricks”? The site caters to the 200/700/900 series that have earned the “brick” nickname due to their squared off shape. Well, I think our car is the ultimate Turbo Brick because it is a turbocharged 940 and in snowy weather it always carries a load of bricks the trunk. How could you get more turbobrickish than that.

It is commonly believed that front wheel drive cars are better in the snow than rear wheel drive. That is sure not the case with my daughter’s C30. Perhaps it has too much power and not enough weight. You could improve traction with a few layers of bricks on the hood but that is tough on the paint job.

In addition to its snow handling aptitude, the 940 has great visibility and nice leather interior, tons of trunk space and at least to my eye not a bad shape. It handles well, has, excellent rust resistance and with its B230 FT turbocharged engine it has plenty of power. Over the years it has been quite economical to own. Until now.

After years of service many of the B230 engines, particularly the B230FT turbo engines start to develop the dreaded piston slap. It starts to show itself as a mild clatter on cold start-up that goes away as the engine warms up. Over time it slowly gets worse until the clatter does not go away even when the engine is at operating temperature. If you keep driving the car as I did, it will eventually sound like a combination of a diesel engine and a machine gun. I usually drive really nice old Volvos like 544s, Amazons, 1800s etc. and I am quite used

to being noticed in traffic by people who like to see the old cars still being driven. The 940 had a similar effect only instead of people saying “nice old Volvo” they do things like shouting out the window “put some oil in that thing!” Very Humbling. Ironically these clattery engines will keep going for a very long time but I just didn’t like the embarrassment.

At this point a normal person would sell the car for whatever they could get and buy another car. I thought about it, but it seemed like such a waste because except for the engine, the rest of the car was in collector-plateable condition and besides that, I liked it. I also learned that Volvo found a solution to the piston slap problem, a solution that Porsche had discovered in the 1970s. That was to install oil squirters that sprayed oil at the bottom of the pistons, cooling them. These improved engines were nick named squirter engines. A well maintained engine so equipped did not develop piston slap. I decided to keep driving my 940-calibre machine gun and look for a good 1993-1995 B230FT “squirter” engine.

That was in May of 2021 and the engine continued to get noisier but kept on going and seemed as powerful as ever. I started putting want ads in our newsletter classified section. I heard exactly nothing until July of 2023 when Dennis Cowell of Kamloops happened on a Kelowna ad for a 1994 B230FT “Kit”. The engine only had 140,000 Km and came with every part necessary to put the engine in any Volvo. The fellow selling the engine had operated a

Volvo repair shop in Edmonton and had retired to Kelowna. He had worked on the one owner 94 940 that provided the engine and consequently knew the engine mileage and condition. The way he tells it the lady owner passed away and he ended up with the car. He knew the car was mechanically sound but it had too much accident damage to be economically restorable. His solution was to remove the engine and every component that made it run and brought the whole works with him when he sold his business and retired to Kelowna. He had a vague idea of installing it in a PV Duet. He just never got around to the Duet project. He found that living in Kelowna to be too expensive, so he decided to move back to Edmonton. The Volvo engine was not moving back with him and that is how it came to be for sale.

This 1994 B230FT squirter engine “Kit” with 140,000 km (87,000 miles), was exactly what I needed and his price was a very fair \$500. The only flaw was that I was not first in line and someone else had committed to purchase the “Kit” but had not shown up when he promised. Dennis Cowell drove to Kelowna on my behalf with cash in hand and to my great good fortune bought the engine, slid it into the back of his 940 wagon and drove it to Vancouver where we slid it out of the 945 and into my utility trailer and I headed for my friend Beau MacGregor’s shop, Manieri Motorworks in Bellingham, Washington, where the engine-ectomy would be performed.

The only flaw was that just before find-





ing the engine in Kelowna I had made the poor decision to let a mechanic try installing hushers on the valves in the faint hope of quieting my 940. He quietened it all right. After the unsuccessful husher installation the engine would not run at all and it



ended up costing me \$700 to get it running so I could drive it to Bellingham where the engine would be taken out and thrown away. You win some. You lose some.

Finally, I drove the 940 to Bellingham and it clattered its way into Beau's beautiful shop. Beau did an excellent job. I stripped all the accessories from the new squirter engine until it was a bare block that I cleaned and painted. He assessed the condition of the new engine. The pan was removed and bearing caps removed and inspected. He confirmed that the squirter were there and clean. He removed the spark plugs and inspected each cylinder with a Snap-on borescope and observed the cylinder honing marks were still clearly visible.

After polling a few Volvo experts, it was decided to use the new 1994 engine just as a long block and retain all the engine wiring,

sensors and ancillaries from the 1991 engine. The logic in that decision was that if the 1994 parts were used future fault tracing could no longer rely on the 1991 940 SE electrical wiring diagrams. In all 38 components such as timing belt, fuel pump, seals, gaskets, sensors, belts, clamps, bushings, fluids, radiator, were replaced as the donor engine were installed.

The 1991 transmission was serviced and mated to the new engine.

A wheel alignment was done and one tie rod end was replaced.

The new engine started and ran smoothly, quietly and has plenty of power. The new oil and filter was dirty within 700 km. That was not surprising as the engine had been stored for years before this installation. The oil was replaced with a new filter and 10/30 Castrol GTX. Now with over 1000

km on the replacement engine it is still quiet and runs like new.

Was it worth it? For a total engine investment of \$5300 which included my \$700 husher screw-up, I have a low mileage engine in an excellent 1991 940SE that should carry on for years and could be converted to collector plates at any time. I cannot think of a newer Volvo I could buy for \$5300 that I would like as much as the 940, so for me it was the right decision.

I recommend Beau MacGregor of Manieri Motorworks, 1680 Baker Creek Place, Bellingham WA, 98226, phone 360-756-2000, [info@manierimotorworks.com](mailto:info@manierimotorworks.com). Beau will work on modern and classic Volvos. He owns a 544, 122, 164, 1800ES and numerous 240s so he knows them well. His shop also works on German cars and even some domestics.







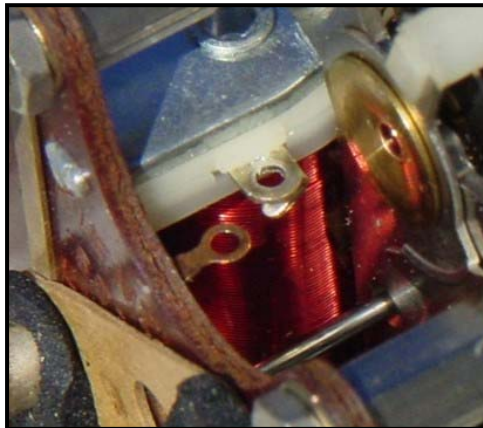
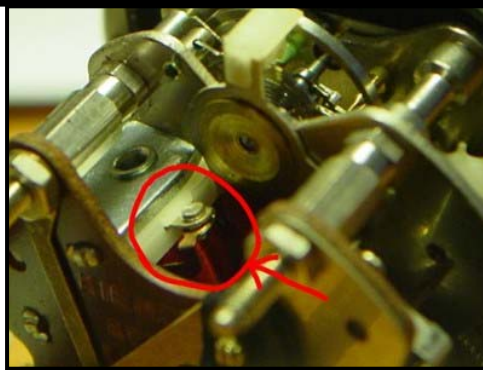
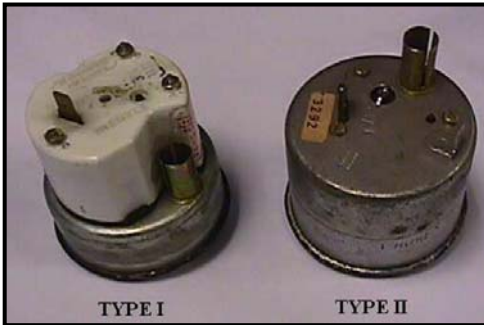
# TECHNICAL TIPS

## VDO CLOCK REPAIR

Gary Beckstead

### Preamble.

In all the articles that I have read about Volvo 1800 models, they say something like: "all of the gauges work, except for the clock". I am sure something similar applies to a lot of other European cars made in the 1960s and 1970s, including Mercedes-Benz and Porsche. Up until the mid-1970s, these cars were equipped with an electrically-wound mechanical clock marked "VDO KIENZLE". Photo 1 illustrates the back of the clock- a Type I that was used to 1972 and the Type II used from 1972 onwards. What maladies befall these clocks?



The points in my clock were clean, but we decided to employ the additional protection provided by the approach discussed in the Mercedes Benz magazine article, namely "to install a circuit modification consisting of a silicon diode and a capacitor. This will suppress the high voltage spark that occurs at the gap between the contacts as they fly apart. (This is self inductance. When the current in the magnet dies because the contacts part, the magnetic field collapses, inducing a reverse current, which makes a destructive spark across the contacts.) Solder a 1N4002 diode or equivalent across the fuse lugs with the cathode (striped end) toward the coil (Photo 5)."



### The Problems.

There are three common failure modes: a blown internal fuse, burned electrical contacts and lubrication failure. I will speak to the first two failure modes and will leave the issue of lubrication for another time.

Firstly I will discuss a blown internal fuse, as that appears to be the problem that I encountered with the Type I clock from my 1972 Volvo 1800ES. Some of the discussion that follows comes from an article entitled "Servicing the VDO Mechanical Clock", written by James Mahaffey in the July/August 1990 edition of the Mercedes Benz Club of America *Star* Magazine (Vol. 35, Issue #4, p24).

"The internal fuse consists of a solder bridge between two bronze lugs at the base of the electromagnet. Normally the bronze piece that acts as the positive power conductor is bent away from the phenolic back-plate so that it contacts the bronze lug at the magnet base, with the two soldered together." Photo 2 shows the intact solder bridge.

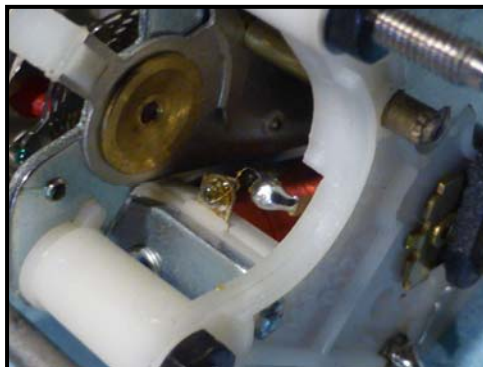
"The spring action of the power-conducting strip puts the fuse in tension, and if it blows, the strip will spring back against the phenolic plate." Photo 3 illustrates the blown fuse.

It would make sense to simply solder the two contacts together. But the problem is that the required low-temperature solder (VDO specifies solder with a melting point of 248°F (120°C) to restore a blown fuse) is difficult to source and extremely expensive:

if you can get it, a very special Indium alloy solder costs (get ready for it) OVER \$350 USD PER FOOT!!

### Proposed Solutions.

Having only a modest knowledge of things electrical, I sought the assistance of Dave, a specialist in automation and controls, for assistance. Since the temperature rated solder is so expensive, he soldered a strand of fine wire (taken from a broken headphone cord) across the gap as illustrated in Photo 4. This was believed to be a reasonable approach to restoring the circuit, as I was going to use a 1.0 Amp in-line fuse external to the clock anyway. If the current gets high enough to do real damage, the little wire strand fuse will probably protect the clock. Dave has used that little fuse trick more than a bunch of time times on equipment costing millions of dollars with no ill effects. And his experience has shown that a small gauge of wire like that will protect most devices.



"Solder the positive side of a 1-microfarad 35-volt tantalum capacitor to the magnet frame on the back plate of the clock, and connect the negative side to ground under the nearest 5 mm nut (Photo 6)."



When Dave assisted me with the repair, he made one modification: The article called for a 1 μF capacitor. He put in a 0.1 μF capacitor that is pretty common for noise suppression.

The modification addresses the burned points problem by reducing the effect of the points or contacts arcing and lengthens their life. It also reduces the generated "noise" when the solenoid energises, or de-energises. It is the same principal as the "condenser" (capacitor) in a points type ignition. The condenser is sized to shunt, or short circuit to ground, any high frequency energy caused by the coil field collapsing.

Some helpful hints and discussion are

provided below:

It's easier to tin the diode before installing it; then less heat is required.

Install the diode across the coil but reverse biased; i.e., the cathode of the diode to the most positive end of the coil. The anode of the diode goes to the negative end of the coil.

Since the collapsing field of the coil is in opposite direction to the normal current flow the diode short circuits the current generated by the collapsing field back into the coil and keeping it away from the contacts.

**References.**

[http://www.pelicanparts.com/techarticles/mult\\_vdo\\_clock\\_repair/mult\\_vdo\\_clock\\_repair.htm](http://www.pelicanparts.com/techarticles/mult_vdo_clock_repair/mult_vdo_clock_repair.htm)

<https://www.sl113.org/wiki/Electrical/Clock>

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**CLASSIFIED ADS**

**TECHNICAL TIPS**

**WHATS NEW (OR OLD) AT VOLVO**

**MY FIRST VOLVO**

**EV PAGE**

**EDITORIALS AND LETTERS**

**SOMETHING DIFFERENT**

**TECHNICAL TIPS**



**VOLVOS IN MOTORSPORT**

**TECHNICAL TIPS**

**EDITORIALS AND LETTERS**

**SOMETHING DIFFERENT**

**REPORT OF PAST EVENTS**

**ROAD TRIP**

**A TRIBUTE**

**TECHNICAL ARTICLE**



**SOMETHING DIFFERENT**  
**REPORT OF PAST EVENTS**

**EDITORIALS AND LETTERS**

**TECHNICAL TIPS**

**VOLVOS IN MOTORSPORT**

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**ROAD TRIP**

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## TECHNICAL TIP

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### 1979 VOLVO 245 TURBO COMES TO LIFE

By Beau MacGregor,

Owner. Manieri Motorworks in Bellingham, WA

Modified automobiles are always more challenging to own and repair, especially if someone else made the modifications. With the proliferation of television shows, online forums, and YouTube channels focused on vehicle restoration and modification, it is all too easy to believe - after watching a show in which a rusty, long disused hulk becomes a fire-breathing custom hot rod in only 30 minutes - that one can simply bolt a bevy of high performance parts to a fine old automobile and call it good. Beware: Its never as simple as it looks. Online car culture - with all its instant gratification and go-fast bravado and often without an eye towards usability or longevity - is no match for formidable expertise of the original Volvo and Bosch engineers who created our cars. The following is a brief account of just such a car

No sooner than my shop had completed a litany of fine-tuning work on a customer's lovely, mildly customized red 1969 142s, - another project car from the same family arrived: A stock looking brick red 1979 Volvo 245DL to which someone has added a turbo-charger and intercooler. Its engine wasn't running correctly and seemed to be getting steadily worse, according to the car's new owner. The father -son duo who own the 142S and the 245DL, respectively, are local Volvo enthusiasts who enjoy modifying their cars for spirited driving. While their penchant for go-fast modifications differs from my own automotive sensibilities, they are good people, easy to work for, and I've enjoyed getting to know them over the past couple of years.

The 245 arrived in a rather ominous fashion one evening, shuddering and smoking its way into the shop's front lot, portending an extended stay and probably a late dinner that night. The son had purchased the vehicle two months before from a local seller, who claimed to have installed a B230FT from a Volvo 740 Turbo five years prior and has been using the 245 as a daily driver since. "Runs great" he reportedly told the buyer.

Arrow straight and wearing its original single stage cinnamon paint, this US-market 245 looked stock, other than the window tint, 16" Hydra wheels and lowered ride height courtesy its IPD coil springs. A crop of aftermarket gauges had sprouted from the dash top and driver's A-post, and XC70 front seats had been installed in this otherwise well-preserved wagon. A turbocharger, intercooler, and all manner of haphazard aftermarket plumbing, littered the engine bay. No B230FT was present: Instead, an older B21 or B23 was in place, the tell tail of the unpainted valve cover and metal timing cover plain to see. Hmm. Did this car's builder simply hang a turbo-charger on a stock B21F?

I took the car for a brief test drive: Engine idle quality was noisy and lumpy but somewhat consistent. While underway, the engine produced enough power to propel the car like a normally aspirated 240 that had needed a tune up, but once in boost, the car fell flat on its face. Though it would not stall, at 3psi of boost engine power cut out completely, then surged back to build up boost again. Think of a young driver learning how to work the clutch in a Honda Civic, the car lurching dramatically along. Just to add to the fun, each apparently boost-induced cut in power was accompanied by significant hissing from under the dashboard, seemingly from two places, as the unmistakable smell of burning engine oil wafted through the cabin. In my haste to regain the car's composure (and my own) I inadvertently activated the wipers: Their linkage was striking something related to the parts store gauge cluster atop the dash, moving them laterally with a pronounced metallic click with each cycle. Yikes. I returned to the shop, parked the stricken 245 and went home to dinner. This could wait.

A couple of days later, with two Subarus, a Toyota, and a most uncooperative BMW E61 turned back into the wild, I set about assessing the 245. The engine was of course not from an 85-740 Turbo: Block number 498978, and head type 1000405 corresponds to a 1982 B23E w/EGR, sold new in a Canadian market 240. It was not originally turbocharged, as evidenced by the lack of turbocharger oil supply/return bosses, turbocharger support provisions in the engine block. On this example, turbocharger oil supply and return lines had been adapted to the oil pressure switch port, and an oil return via brazed fitting on oil pan, respectively. The B23E came with flat top pistons and 10:1 static compression, and a high lift, long duration "K" grind camshaft, both of which this engine retained. It's a nice, powerful motor especially well adapted to a manual transmission but certainly not meant for forced induction. While modern turbocharged gasoline powered engines can handle high static compression (12:1 in some cases) early eighties engine technology required much lower static compression to avoid detonation and quick destruction.

"FT" Turbocharged red block engines came from the factory with lower static compression via dished pistons, sodium filled exhaust valves to better dissipate significantly higher heat load from compressed charge air, and a "T" grind camshaft, optimized for forced induction. A turbocharger on a B23E is cause for concern: High static compression combined with forced induction can - if the boost is not left at a mild level- quickly melt engine internals even if the engine is running properly.

Further investigation revealed the presence of a Bosch Jetronic LH 2.2 fuel injection system (1985-1988) and an EZK117 Ignition system 89-95). A high-quality aftermarket conversion wiring harness, likely from DaveBarton.com was present, though its lacked a ballast resistor connector to run the low impedance fuel injectors specific to the turbocharged red block. An inventory of fuel and ignition components revealed the following issues.

Incorrect ECU #280000544 non-turbo B230F.	280000518 / 541	required.
Incorrect EZK control unit #260201011 non-turbo B230f.	260201012	required.
Incorrect fuel pump present: 580464126 BMW E21 320i,	580464025	needed.

Incorrect fuel injectors present: 280150415 BMW 6-cylinder application.

Incorrect fuel pressure regulator: 2.5bar v. 3bar for turbo cars.

No fuel injector ballast resistor present.

Additional build quality issues revealed that the crankcase ventilation system was incorrectly connected, such that charge air was allowed to enter the crankcase under boost. No check valve was present on the climate control vacuum pickup, and the ancient brake booster check valve had failed: Both the HVAC vacuum lines and booster were subject to charge air intrusion under boost. "Well," I thought shaking my head, "That explains the blown front engine oil seals and under-dash hissing."

In summary, only four application-correct engine management parts were present: The air 007 mass meter, throttle switch, idle air

valve, and the ecu's coolant temperature sender. Everything else was poorly executed and just flat wrong, contributing to a leaking intake tract and insufficient fuel delivery. Intake and exhaust valve clearances were all extremely tight, averaging about 0.010", whereas Volvo specifies 0.016-0.018 for a warm engine. Without sufficient contact with the cylinder head for heat transfer, these exhaust valves were not long for the world. The supposedly new "high performance" blue plug wires had all but fallen apart on two cylinders, and the filthy throttle body was not even close to closing at idle.

On a hunch, I used a smoke machine to check for leaks in the intake tract: No obvious leaks were found up front but why was a small amount of smoke coming from under the rear of the car? Answer: An ancient, dangling fuel evaporative emission hose, long orphaned and dangling above the rear axle, I did not need the smoke machine know that the #4 exhaust manifold gasket was leaking.

While under the car, one couldn't help but to notice the odd angle of the steering rack: Someone had omitted the right-hand stand-off mount. the rack was about 10° off plane with the front cross member. Nice. This, in addition to the lowering springs, which when installed without steer roll correction brackets on the ball joints, creates excess strain on the tie rods due to steep angles between the knuckle and the rack. Strange steering behavior ensues: Heavy, vague steering feel due to diminished direction force on the knuckles, creates significant and sudden changes in steering force required at the wheel as load and trajectory shift. Not all aftermarket parts are well thought-out: One change begets another...

The first order of business was to make the engine run properly. An intercooled, turbocharged engine is subject to a higher density of oxygen in the cooled charge air; therefore, the ability of the engine to receive the corresponding increase in fuel is imperative. On this car, the wrong fuel system parts were causing a dangerously lean running condition, due to too little fuel.

Incremental progress was made over several days as time allowed. I began with a proper valve adjustment, setting the clearance to a loose but heat absorbing 0.020". New tappet dampers, front engine seals, timing belt and tensioner, v-belts, spark plugs, and quality ignition wires followed. All this, plus a thoroughly cleaned, resealed and properly adjusted throttle body and functioning vacuum check valves allowed the engine to start and idle reasonably well, but without proper fuel management in place, a lean running condition while under boost could cause engine damage.

Shiny aftermarket charge air pipes were present, but with no provision for a crankcase ventilation port. Larry Watson of Rainbow Auto Service brazed a port into place on the turbo inlet pipe one day while I was hunting for parts there. A nicely made aftermarket Yoshifab breather box was present on the car, and it didn't take long to correctly connect the hoses.

With this done, I set about sourcing the correct fuel and ignition pieces: Rainbow Auto Service had everything I needed, used, except the 3-bar fuel pressure regulator, was available new. The crux of this stage was the integrating the ballast resistor into the main fuel injection harness. DaveBarton.com is an excellent source of information for all things RWD Volvo, and produced, for a time, a line of 240-specific conversion harnesses that allow for newer running gear into older cars. The subject 245 had one of these, though an earlier version that lacked the resistor accommodation. Off came the intake manifold for access to the main wire loom: With the help of the Volvo's Green Book wiring diagrams, I was able to splice in pigtail removed from a 740 Turbo parts car, then plug in and mount the ballast resistor. Correct 0280150804 low impedance injectors, new injector seals, a new 3-bar pressure regulator, and intake manifold gasket were installed, after first verifying the functionality of the ECU'S coolant temperature sensor.

The presence of the correct fuel pressure regulator revealed another issue: The BMW E21 fuel pump was weak. It produced only about 35psi of line pressure, well below the specified 60psi needed to avoid pressure drop under full load conditions. Up the car went for a new fuel pump, in-tank-pump feeder hose, and sending unit seal.

The engine now started eagerly and settled into a calm, smooth idle, much like properly running 740 Turbo would do. It was time to drive the car: Gone was the boost-induced lurch, under-dash hiss, and rough running. The B23E's mild power to 3000rpm gave way to a significant shove to redline, 5.5psi of boost coming on in tandem with the K-cam's power curve. "Wow! The K-cam and a turbo-charger can indeed work together!", I thought, trying to ignore the tell tail tick of the #4 exhaust manifold gasket leak that meant yet more time spent on the car.

Back in the shop, it was time to replace and exhaust manifold gaskets. A Garrett 13G turbo isn't large, but combined with its manifold, constitutes substantial weight. All factory FT blocks have a support bracket provision, but early B21F and B23F blocks do not. Therefore, on this car the entire weight of the assembly rests on the eight manifold studs. New OE studs, nuts and the correct thick washers were installed, as well as new turbocharger mounting studs, nuts, and gaskets. The builder's improvised oil supply and return lines were a bit easier to deal with during this operation than stock, though the return lines port below the oil pan's "full pool" made for quite a massive oil leak when removed. With the manifold and turbocharger out of the way, the 740-style oil cooler/oil filter assembly was removed, cleaned and resealed. New engine oil (Liqui Moly 5w40) and a Mann filter were installed.

The last few miscellaneous items required to put the car back on the road were straightforward: Remount steering rack on correct stand offs, replace a torn LH rear control arm bushing, and perform a four-wheel alignment on the shop's Hunter Hawkeye alignment rack. With the car now tracking straight but with weak steering wheel snap back to center courtesy of the lowering springs, I set about sorting out the electric cooling fan: It was not operating as it should while underway. This malady was traced to an incorrect temperature switch in the radiator: Someone had placed a coolant temperature gauge sender in the radiator, but only after modifying the radiator to accept the wrong part! Grrrrrr! Rather than dealing with two round trips to the nearest radiator shop in Surry, I promptly installed a new, unmodified radiator and the correct thermal switch, and presto! The fan cycles on and off when it should, keeping the engine at a steady 190°F of so. All this without having to ground the sender with a jumper wire to make the fan work. What a concept.

A thirty-mile test drive revealed a strong running engine with no behavioral issues. Although still a 1979 245, the car now possessed the power of a healthy 740 Turbo. This is a meaningful improvement over the K-Jetronic system in the original 240 Turbo. The car will require further sorting to be truly reliable: A battery drain courtesy of the XC70 power seat custom wiring, climate fan replacement, transmission reseat, and of course a tie rod angle correction. Given the nature of the B23E, I've advised my client to keep an eye out for a good B230FT long block, and not to dial up any more boost in the meantime. That K cam really needs a bigger turbo to breath properly, but that means turbo specific engine modifications. Where exactly does one stop on a project such as this?

All told, many hours of shop time, a lengthy list of new & used parts, and a lot of the customer's patience was required to make this 245 a viable machine once again. With all the issues that car had upon arrival at my shop, that the car ran at all was improbable, much less functional as the previous owner's daily driver. I felt bad for my customer, a hard-working, enthusiastic young man who spent his dollars on this car not knowing what laid in wait. We've all been there. He's not the first to see an old car through rose-colored glasses

and certainly will not be the last; for folks have been modifying their cars since the first Model T appeared. Such phenomenon has accelerated over the decades, but it still pays to do one's research ahead of time to know that you aren't buying someone else's guesswork and always obtain a thorough pre-purchase inspection for any car. The owner now has a great-running and very cool Volvo 245 to show for his investment!

